Ethical Dilemmas in Synthetic Biology

A Presentation by Annapolis Valley Quakers, September 4, 2013

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|  | Welcome and Introductions |
|  | Synthetic Biology: What Is It?* **Genetic Engineering**: modifying a life form’s genes
* **Genetically Modified Organism (GMO)**: a life form created by scientists
* **Synthetic Biology**: Using computers to automate genetic engineering
	+ Makes it easier, faster, and cheaper to create genetically-modified organisms (GMOs)
* Video: <http://www.youtube.com/watch?v=rD5uNAMbDaQ>
 | My questions are… |
|  | Why Now?* To apply the precautionary principle:

“…in the absence of full scientific certainty that harm would not ensue, the burden of proof falls on those who advocate for” an action.* To explore the spiritual aspects of concern
 | What are my ideas about how to apply the precautionary principle?What are my spiritual concerns about synthetic biology? |

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|  | Possible New Technologies | Examples | Other New Technologies? |
|  | * New materials
 | Synthetic spider silk, plastics |  |
|  | * Foodstuffs
 | More productive or nutritious |  |
|  | * Medicines
 | Anti-malaria drug, micro-species that produce blood or vaccines |  |
|  | * Energy sources
 | Algae for biofuel |  |
|  | * Remedies for pollution
 | Arsenic-detecting bacteria |  |
|  | * Computing
 | Using DNA to encode data |  |
|  | * Weapons
 | Biological, chemical |  |
|  | * Manipulating species’ genome
 | Increased intelligence, immunity, lifespan |  |
|  | Possible ConcernsAbout the ecosystem:* Loss of biodiversity
* New illnesses, unhealthy conditions, biological stresses on people, animals, plants, microorganisms
* Lack of long-term study

About social and political issues:* Biological weapons
* Concentration of wealth
* Concentration of knowledge because of patents and intellectual property law
* Diversion of public funds
* Providing a smoke screen for risky or unpopular technologies by disguising them as “exit-from-oil” strategies

About moral issues:* Private ownership of life
* Infringing on reproductive rights
* Infringing on rights of people with disabilities, especially in conversations where they are not full participants
* Difficulty of oversight, regulation, enforcement
* Overstating our knowledge, underplaying our uncertainty
 | Other Concerns? |
|  | Possible Ways to Respond1. Risk research
2. Pre-market regulation
3. Enforcement mechanisms
4. Preventing exposure until safety is demonstrated and oversight is in place
5. Monitoring for unintended consequences
6. Ban on manipulating the human genome
7. Full disclosure of safety testing before commercial release
8. Moratorium on release or commercial use
9. Disallowing patents on genetic sequences
 | Other Ways to Respond? |
|  | QueriesAbout ecology:1. Will important features of life be ignored by viewing it through engineering principles?
2. What might synthetic organisms do unexpectedly?
3. How will this affect biodiversity locally and globally?
4. Will benefits be distributed equitably?
5. How can society address these questions when the answers are unknown?

About social and economic concerns:1. How can informed democratic processes play a role in decisions about this new technology?
2. What mechanisms and institutions can assure international justice and equitable distribution in the application of these technologies?
3. Is regulation possible? How could it be enforced? How can we regulate knowledge?

About moral concerns:1. How do we avoid placing too high a value on technology at the expense of intrinsic human intelligence?
2. Can we afford to consciously manipulate evolution?
3. What is sacred in living beings, and how might synthetic biology affect it?
 | My Queries |
|  | My Thoughts |
|  | Questions and Answers |

The Quaker Institute for the Future publishes pamphlets on “human betterment and maintaining the Earth’s ecological integrity.” Full texts are available (<http://www.quakerinstitute.org/?page_id=5>) on these topics:

* *Beyond the Growth Dilemma*
* *It’s the Economy, Friends*
* *How Does Societal Transformation Happen?*
* *Genetically Modified Crops*
* *How on Earth Do We Live Now?*
* *Fueling Our future*

Annapolis Valley Quakers meet in the homes of local members at 10:30am each Sunday morning. All are welcome. Call or email for locations.

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